Real estate diversification

Chapter 7
Summary and Suggestions for Further Research

This study is concerned with various issues concerning the diversification of real estate portfolios. In the first chapter, we have argued that the art of real estate portfolio diversification is the main added benefit of an investment expert over the uninitiated. This is a direct consequence of the applicability of the financial economics paradigm to real estate finance. In this last chapter, we give an overview of the key findings of this study. Besides the scientific relevance of these findings, we focus on their practical implications. The second goal of this chapter is to give suggestions for a future research agenda in the field of real estate diversification, both with an international and with a Dutch perspective.

7.1 Summary

For empirical research in real estate investments, the foremost problem is that real estate returns are not directly observable. This is due to the heterogeneity of property and the lack of a central market place where prices are made public. This study is not only empirical in nature, it is also international. This implies that the data problems are aggravated, and therefore an important contribution of this dissertation is the exploration of hitherto unexamined datasets.

This holds especially for Part One, in which we focus on the question of real estate diversification by geographic region. More specifically, we investigate economic, rather than regional, diversification of the real estate portfolio. In this approach we analyze the basic economic composition of regions to determine efficient diversification strategies. To classify regions, we use employment shares in economic sectors, thus making a demand side connection to the real estate market. This connection is not formally tested in Chapter 2, but the intuition behind this approach is appealing. The idea is that regions which share basic economic characteristics have correlated employment. Therefore, real estate returns among these regions will also be correlated, in particular if the supply situation in these regions is similar. On the other hand, if regions do not

share these economic characteristics, their employment figures and thus their real estate returns will probably have low or negative correlations. Risk reduction can thus be achieved by combining real estate in such regions in the portfolio.

Chapter 2 deals with economic diversification in European real estate portfolios, and distinguishes 74 different regions. It uses a modified chi-square technique to classify regions as either diverse or specialized. Our findings indicate that regions with common specializations are spread over Europe, so regionally diverse investments are not necessarily economically diverse. This suggests that real estate investors investing in Europe can't realize optimal risk reduction by regional diversification alone. To this end, it is critical to give due weight to the economic characteristics of the regions in which is invested. On the other hand, we also find many regions to be internally diverse, which leads one to conjecture that real estate investments in such regions are less risky than in other regions. However, we do not provide empirical support for this conjecture in Chapter 2.

In Chapter 3 we develop a number of indicators of regional economic diversity and stability and we formally test their relationship with real estate risk. The assumption is that diverse and stable regional economies also have stable real estate portfolios. Again, we use regional sectoral employment shares to construct our indicators, but in this chapter we only use regional employment data from the Netherlands, which allows us to look at the problem in a very detailed way. We investigate the explanatory power of the constructed indicators of defaults in regional mortgage portfolios. To this end we use a dataset of the population of publicly insured Dutch mortgages for the period 1976 through 1990. The conclusions of this chapter are that dynamic measures of economic stability outperform static measures of economic diversity in explaining regional mortgage default rates. Currently, mortgagers insured by the Dutch public mortgage guarantee system pay no premiums for this guarantee. All risk is borne by the government. However, a discussion whether to introduce premiums is going on. Our results imply that regional economic stability should be taken into account when determining the premium for a public mortgage guarantee. The main finding of the chapter is that the demand side relationship between the real estate market and regional employment indeed exists. In other words, the intuition behind the approach used in Chapter 2 is shown to be correct. This implies that using regional employment characteristics as a basis

for the diversification of real estate portfolios leads to better results than regional diversification.

In Part Two of this dissertation we use property share returns data to test ideas concerned with international real estate diversification. In Chapter 4, we examine the nature of property share index returns. More specifically, we investigate to which extent these returns look like stock returns or like other known real estate return indicators, i.e. appraisal-based returns. The relationship between return indices of property shares and the stockmarket on which they trade is investigated for twelve countries using a standard market model. For all of these countries except for Switzerland, we find the stockmarket to explain the variance in the returns of property share indices to a very significant extent. This means that the diversification potential of introducing real estate in a stock portfolio is limited. For the United States, this has been shown to be the case before, but it was not clear if it would hold internationally as well. Another finding here is that there are similarities in risk and return between property share indices from countries belonging to the same continent. Stock market betas of real estate are highest in the Far East, and lowest in Europe and North America. This can probably partly be explained by differences in rent contracts between the three continents.

These findings notwithstanding, property shares also behave like real estate. In Chapter 4 we also examine the relationship between property share returns and appraisal based returns for four countries. To this end, we employ an error correction model, which leads to the conclusion that property share returns significantly predict appraisal based returns. This indicates that the use of property share returns as a proxy for real estate returns makes economic sense. This has important implications for international real estate research. Data of property share returns are available for many countries, whereas appraisal based returns data are not. This implies that international real estate research is possible for many more countries than would have been the case if research would have required appraisal based returns.

In the next chapter, Chapter 5, we continue studying the property share returns. The differences between real estate returns in different continents we found in Chapter 4 are investigated more thoroughly here. We inquire into the existence of continental factors determining real estate returns. The existence of such factors makes intuitive sense, since capital and goods and services often flow

more freely within continents than among them. This means that simultaneous movements of both the supply and the demand of real estate in the countries in one continent can be expected. If there are indeed common international movements in real estate supply and demand, then this commonality should also be discernible in real estate returns. To study this commonality, we develop and employ a new version of principal components analysis. This method has the advantage that the components we extract are independent of the choice of the numeraire currency. This is important, since it makes our results relevant to investors from all countries.

In Chapter 5 we find clear evidence of the existence of continental factors in real estate returns: real estate markets are internationally segmented along boundaries of continents. Real estate returns in the Far East show common movements, and the same holds for Europe and North America. Japan and the United Kingdom are exceptions. Japanese real estate returns are idiosyncratic and do not show common movements with real estate in other countries, Asian or not. On the other hand, real estate returns in the United Kingdom show common movements with both European and Far East countries' real estate returns. The implication of these findings is that intercontinental investing is required to achieve optimal international portfolio diversification. Investors trying to realize optimal risk reduction in their real estate portfolio by investing internationally cannot achieve this by only investing in one continent. The main other finding of this chapter is that the component structure of international real estate returns is largely independent of the decision whether to hedge the international real estate portfolio against currency risk or not. Currency risk does not play a very important role in the total risk of international real estate investments.

Chapter 6, the last empirical chapter of this dissertation, looks at the variance-covariance structure of international property share returns. Portfolio models, which are used to generate efficient international asset allocations, require estimates of a variance-covariance structure of asset returns as input. Usually, the realized structure is used as a proxy. If that is the case, then the validity of the model's output critically depends on the stability of the variance-covariance structure. In Chapter 6, we perform several tests to examine whether the structure of international property share returns is stable in time. Intuitively, one would expect this not to be the case, since property share returns are, at least partly, influenced by the real estate markets, and these, in their turn, move

internationally in a non-synchronous way. The intuition is confirmed by our formal tests. We find covariances of international property share returns to be unstable, while correlations are stable beteen some time-periods, and unstable between others. The results cast serious doubts on the use of standard portfolio models for international real estate allocation.

7.2 Further Research

In this section we give suggestions for a future research agenda in real estate investments. Four aspects of this agenda are relevant to the international real estate literature, while others are specifically relevant to the Netherlands.

There is an extensive literature regarding the international diversification of stock and bond portfolios. Theoretical models like the International Capital Asset Pricing Model and the International Arbitrage Pricing Theory have been developed and exposed to the data. In contrast, international real estate portfolio diversification has not received much attention in the literature. The theoretical reasons why international diversification works for stocks and bonds also apply to real estate, but due to lack of data, empirical examination of these theories has hardly taken place. Therefore, the most vital task for a researcher in the field of international real estate portfolio diversification is the construction of databases of international real estate returns.

As a first step, it is necessary to update and expand the datasets of property share returns we use in Chapters 4 through 6. The Salomon Brothers database only includes indices for 12 countries in the period January 1985 through September 1990. Adding data for countries from the Far East like Taiwan, Thailand, and New Zealand would be good, as would be including more European countries like Italy, Belgium, Denmark, Norway, and Austria. Another important matter is to have more observations per country index, both by giving the time series a longer history and by updating them. Partly, this is already accomplished in the Datastream dataset we use in Chapter 6. However, the indices it contains only include large stocks. Since many property companies are small stocks, this implies that a substantial amount of listed property companies is not included in the index. Based on such an expanded international dataset of property share returns, it would be possible to investigate the applicability of international asset pricing models to real estate. Less fundamentally,

but more importantly from a practical point of view, such a dataset would allow further research in the benefits of international real estate portfolio diversification.

A second direction international real estate research should pursue is further investigation of the relationship between property share returns and appraisal based returns. In the United States, this relationship has been under extensive scrunity, but internationally, this is not the case. In Chapter 4 of this study, we have addressed this problem for four countries including the United States. The universe of countries for which this kind of research is possible should be expanded by constructing appraisal based return indices for as many countries as possible. However, this is easier said than done. In the Netherlands, for example, initiatives to this end were repeatedly undertaken, but have never led to the intended result. Nevertheless, the development of an appraisal based index is especially important for the Netherlands, since most Dutch property companies listed on the stock exchange invest predominantly abroad. The returns of their shares are therefore not useful as indicators of the returns of the Dutch real estate market. The same necessity to create an appraisal index exists for a country like Germany, where property shares are not listed on the stock exchange. For these countries, an appraisal based index would be the best indicator of real estate returns.

In the literature, the debate whether appraisal based returns are reliable indicators for real estate returns continues. Using appraisal based returns in an asset allocation model overestimates the allocation of real estate in the portfolio, due to the low variance of the returns. Therefore, it is better not to use asset allocation models to determine the optimal real estate allocation, but to estimate market values of real estate in a country. This value can then be combined with the value of other investable assets, to get the composition of the total market portfolio for the country. Optimal asset allocation within the country can then be achieved by investing pro rata in this market portfolio. Our third suggestion for an international real estate research agenda is to use the same strategy to determine the optimal country allocation of the international real estate portfolio. We have seen in Chapter 6 that the international covariance structure of property share returns is not stable. This limits the applicability of portfolio models to generate optimally diversified international real estate portfolios. By calculating the total value of real estate in many countries, however, we can get an estimate of the value and composition of the world real estate portfolio. This

portfolio, corrected for the effects of international capital market segmentation, gives an indication of the optimal international allocation of real estate investments.

Our fourth and last suggestion regarding international real estate research concerns the use of employment data to base real estate diversification decisions upon. This approach can help these decisions in two cases, country allocation and regional allocation of real estate investments. For countries for which indices of real estate returns do not exist, employment data can be viewed as a second best indicator of real estate return behaviour, and they can be used to investigate the riskiness of real estate investments in those countries. For the regional allocation of real estate investments, the employment approach is even more useful. Real estate returns data, if available at all, is usually only available at the country level. Only in the United States, Canada, and the United Kingdom do we have regional real estate returns data, but the level of disaggregation is not very high. By contrast, regional employment data is available for many countries, and usually, the level of disaggregation is very high, often going as far as the individual metropolitan area. In this study, we use European Community employment data for 74 regions, but it is also interesting to use data for more countries than just the 12 European Community members. Also, in Chapter 3 we have concluded that changes in the economic structure of a region are linked more strongly to real estate risk than the economic structure as such. It is therefore insightful to not only analyze the economic structure, but also its dynamics: to analyze the changes of the economic structure in time.

For the Netherlands, our suggestions for future research follow three separate lines. First, as was mentioned before in this study, the construction of an appraisal based real estate returns index should be high on the list of priorities of any real estate researcher. For the Netherlands, this is even more necessary than for other countries. A return index of Dutch property companies' shares would not give much information about Dutch real estate, since Dutch property companies mostly invest abroad. The lack of a reliable real estate returns index in the Netherlands hampers serious research and performance measurement.

The investment policy of the Dutch property companies brings us to our second suggestion regarding Dutch real estate research. Dutch property companies' investment policy differs substantially from the policy of their counterparts abroad. Except for those in the Netherlands, property companies are usually

very regionally specialized, often investing in only one region or city. Intuitively, this makes more sense than investing all over the world. Real estate is, after all, a local business, and investors in real estate can diversify internationally by themselves, by buying the shares of locally investing property companies in different countries. This way, they buy local knowledge of real estate markets at the stock exchange. It would be interesting to investigate the best of two possible strategy for international diversification for a Dutch investor. The first strategy is to buy the shares of the internationally operating Dutch property companies, and invest globally by buying locally. The other strategy is to buy the shares of foreign property companies, which operate strictly local, and invest locally by buying globally. The results would be very relevant to Dutch institutional investors, and, may be more so, to Dutch property companies.

A third interesting field for future research in the Netherlands is mortgage risk. In Chapter 3, we have looked at mortgage default risk, using a regional point of view. Further analysis of default risk and of other risk sources of mortgages is very important, both from a practical and from a scientific point of view. A thorough investigation of the mortgage-specific risk factors, like age of the mortgage and the ratio of the mortgage value to the value of the house would be interesting, but the relationship between macro economic fundamentals and mortgage risk should also be examined. Interest rates, and their term structure, default risk premia, unemployment and national income growth are all likely to influence the risk of mortgages. Research in the determinants of mortgage risk is very important. For many banks and institutional investors, mortgages are a large part of the investment portfolio. The development of so called mortgage backed securities, bonds covered by portfolios of mortgages, has made the mortgage market even more important to investors. Mortgage risk is also an important public policy item, since the Dutch mortgage guarantee system is public, and the government wants to stimulate private home-ownership. Research into mortgage risk can lead to a better understanding of the costs and benefits of public mortgage guarantees as a catalyst to private home-ownership.

All in all, many fields in real estate finance have yet to be explored, both internationally and in the Netherlands. This dissertation, as any dissertation, merely scratches the surface of the iceberg of work still to be done. Nevertheless, in real estate finance we have come a long way since the nomad days.

Nederlandse Samenvatting

Net als andere beleggers zijn ook beleggers in vastgoed geïnteresseerd in het behalen van een zo hoog mogelijk rendement bij een gegeven risico. Het spreiden van risico, diversificatie, is daarbij een belangrijk hulpmiddel. In deze dissertatie staat diversificatie van onroerend goed centraal. Verschillende aspecten die van belang zijn voor de diversificatie van de vastgoedportefeuille worden hier empirisch bestudeerd.

Voor empirisch onderzoek naar vastgoed investeringen is de voornaamste hindernis dat vastgoed rendementen niet direct observeerbaar zijn. Dit wordt veroorzaakt door de heterogeniteit van vastgoed en het ontbreken van een openbare vastgoedmarkt, waar prijzen bekend worden gemaakt. Dit geldt in nog sterkere mate voor internationaal onderzoek naar vastgoed beleggingen. Aangezien deze dissertatie zowel internationaal als empirisch van aard is, is een belangrijke bijdrage ervan de exploratie van tot nu toe niet bestudeerde databronnen.

Dit geldt met name voor het eerste deel van de dissertatie, dat gericht is op regionale diversificatie van de vastgoedportefeuille. In deze benadering analyseer ik de economische samenstelling van regio's om tot efficiënte diversificatie van de vastgoedportefeuille te komen. Hiertoe maak ik gebruik van de verdeling van de werkgelegenheid over de verschillende economische sectoren binnen regio's, hetgeen een verband veronderstelt met de vraagzijde van de vastgoedmarkten. De intuïtie is hier dat vastgoed rendementen in regio's die dezelfde economische samenstelling hebben, positief met elkaar correleren. Dit zal met name gelden als de aanbodsituatie op de regionale vastgoedmarkten overeen komt. Aan de andere kant, als regio's economisch van elkaar verschillen, dan zullen zowel de werkgelegenheidscijfers als de vastgoed rendementen lage of negatieve correlaties vertonen. Risicospreiding kan dus worden bereikt door een portefeuille samen te stellen met vastgoed in zulke gebieden.

Hoofdstuk 2 past deze benadering toe op Europese vastgoed portefeuilles. Met behulp van een aangepaste chi-kwadraat toets worden 74 Europese regio's geclassificeerd als divers of gespecialiseerd. De bevindingen geven aan dat

regio's met dezelfde economische specialisaties verspreid zijn over Europa. Dat betekent dat investeringen die regionaal gespreid zijn, niet noodzakelijkerwijs ook economisch gespreid zijn. Optimale spreiding van de vastgoedportefeuille is dus niet te bereiken door naïeve regionale spreiding alleen. Daarvoor is het van belang de economische karakteristieken van de regio's waarin belegd wordt met elkaar te vergelijken. Echter, niet alle regio's kennen een economische specialisatie. Veel regio's hebben een gediversifieerde economie, en onroerend goed in die regio's is waarschijnlijk minder risicovol dan in gespecialiseerde regio's.

In hoofdstuk 3 ontwikkel ik een aantal indicatoren van regionale economische diversiteit en stabiliteit, die ik gebruik als verklarende variabelen van onroerend goed risico. De veronderstelling is dat onroerend goed in gediversifieerde en stabiele regio's een relatief laag risico kent. Opnieuw zijn de indicatoren gebaseerd op werkgelegenheidscijfers, maar in dit hoofdstuk gebruik ik alleen data voor Nederland, wat betekent dat ik de analyse op een meer gedesaggregeerd niveau kan uitvoeren dan in hoofdstuk 2 het geval was. Ik onderzoek in hoeverre de geconstrueerde indicatoren een verklaring geven van hypotheek-faillissementen. Hiertoe maak ik gebruik van een dataset die de populatie van Nederlandse, tussen 1976 en 1990 gefailleerde hypotheken met een overheidsgarantie omvat.

De conclusies van hoofdstuk 3 zijn dat dynamische maatstaven van economische stabiliteit een betere verklaring geven voor hypothecair risico dan statische maatstaven van economische diversiteit. Nederland kent een vorm van hypotheekgarantie waarbij de hypotheekgever (de geldlener) geen premie betaalt. Het risico wordt gedragen door de overheid. Er is echter discussie gaande over het introduceren van premies. De resultaten van dit onderzoek geven aan dat regionale economische karakteristieken dienen worden meegenomen in het bepalen van de eventueel in te voeren premies. De voornaamste bijdrage van dit hoofdstuk is echter dat de relatie tussen de vastgoedmarkt en regionale werkgelegenheidscijfers, die in hoofdstuk 2 verondersteld werd, hier wordt aangetoond. Dit betekent dat gebruikmaking van regionale werkgelegenheidscijfers als basis voor de diversificatie van vastgoedportefeuilles inderdaad tot betere resultaten leidt dan naïeve regionale diversificatie.

In het tweede deel van deze dissertatie worden rendementen van vastgoed

aandelen gebruikt om ideeën te toetsen die te maken hebben met internationale diversificatie van vastgoedportefeuilles. In hoofdstuk 4 onderzoek ik eerst de gebruikte rendements-indices van vastgoed aandelen. Ik onderzoek of deze rendementen zich gedragen als aandelenrendementen of meer als de rendementen van andere bekende indices, met name indices die zijn gebaseerd op taxaties. Het verband tussen vastgoed aandelen en de aandelenmarkten wordt hier voor 12 landen onderzocht met behulp van een standaard marktmodel. Behalve voor Zwitserland vind ik voor al deze landen dat de aandelenmarkt de rendementen van vastgoedaandelen significant verklaart. Dit betekent dat het diversificatie potentieel van het introduceren van vastgoed in een internationale aandelenportefeuille niet groot is. Een andere bevinding is dat de beta's van vastgoed per continent verschillen. De beta's zijn het hoogst in het Verre Oosten, en lager in Europa en Noord Amerika. Dit kan in ieder geval gedeeltelijk worden verklaard door verschillen in huurcontracten tussen deze drie continenten.

Desalniettemin gedragen vastgoed aandelen zich ook als vastgoed. In hoofdstuk 4 onderzoek ik voor 4 landen de relatie tussen vastgoed aandelen en taxatie-gebaseerde rendementen met behulp van coïntegratie modellen. De resultaten geven aan dat rendementen op vastgoed aandelen een significante voorspelling geven van taxatie-gebaseerde rendementen. Dit betekent dat gebruikmaking van vastgoed aandelen als een benadering voor vastgoedrendementen economisch zinvol is. Voor onderzoek naar de internationale aspecten van het beleggen in vastgoed is dat van groot belang, omdat rendementsgegevens van vastgoed aandelen beschikbaar zijn voor veel meer landen dan alleen die waarvoor taxatie-indices beschikbaar zijn.

In het volgende hoofdstuk, hoofdstuk 5, ga ik dieper in op de eerder genoemde continentale verschillen tussen rendementen op vastgoed aandelen. Ik onderzoek continentale factoren die vastgoedrendementen bepalen. Het bestaan van zulke factoren is plausibel omdat kapitaal, goederen en diensten zich vaak gemakkelijker verplaatsen binnen continenten dan tussen continenten. Dit betekent dat tussen landen liggende in eenzelfde continent gelijktijdige bewegingen van zowel de vraag als het aanbod van vastgoed te verwachten zijn. Te verwachten is dat deze bewegingen dan ook zichtbaar zijn in de rendementen op dat vastgoed. Om de continentale vastgoedfactoren te bestuderen ontwikkel en gebruik ik een nieuwe vorm van principale componenten analyse. Deze methode heeft het voordeel dat de gevonden componenten onafhankelijk zijn van de keus van

de muntsoort waarin de analyse wordt gedaan. Dit is belangrijk omdat de resultaten hierdoor relevant worden voor investeerders uit alle landen.

In de empirische analyse van hoofdstuk 5 vind ik de verwachte continentale factoren in vastgoed rendementen. Vastgoedmarkten blijken internationaal gesegmenteerd te zijn langs grenzen van continenten. Vastgoed rendementen in het Verre Oosten vertonen vergelijkbare bewegingen, en ditzelfde geldt voor Europa en Noord Amerika. Uitzonderingen zijn Japan en het Verenigd Koninkrijk. Japans vastgoed vertoont geen overeenkomsten met ander vastgoed, of dat nu in het Verre Oosten is of niet. Brits vastgoed, daarentegen, toont gelijkenis met zowel Europees vastgoed als vastgoed in het Verre Oosten. Deze resultaten betekenen dat een intercontinentale benadering noodzakelijk is om tot optimaal gediversifieerde vastgoedportefeuilles te komen. Met investeringen in slechts één continent kan van optimale risicospreiding geen sprake zijn. De andere belangrijke bevinding in dit hoofdstuk is dat de componenten structuur van de vastgoed rendementen grotendeels onafhankelijk is van de beslissing de portefeuille al dan niet tegen valutarisico af te dekken. Valutarisico speelt een ondergeschikte rol in het totale risico van internationale vastgoed beleggingen.

Hoofdstuk 6, het laatste empirische hoofdstuk van deze dissertatie, onderzoekt de internationale covariantiestructuur van rendementen op vastgoed aandelen. Portefeuillemodellen, die gebruikt worden om efficiënte internationale allocaties van beleggingen te genereren, vereisen als imput schattingen van de variantie-covariantie structuur van die beleggingen. Doorgaans wordt hiervoor de gerealiseerde structuur gebruikt. De uitkomsten van het gebruikte model zijn dan alleen zinvol als de variantie-covariantie structuur stabiel is in de tijd. In hoofdstuk 6 toets ik of dit het geval is voor vastgoed aandelen. De verwachting is, dat dit niet het geval is, omdat rendementen op vastgoed aandelen in ieder geval gedeeltelijk worden beïnvloed door de nationale onroerend goed markten, die niet synchroon bewegen. Deze verwachting wordt in de formele toetsen gestaafd. Covarianties zijn inderdaad niet stabiel, terwijl correlaties stabiel zijn tussen sommige tijdsintervallen, en niet stabiel tussen andere. Deze resultaten betekenen dat het gebruik van standaard portefeuille modellen voor het bepalen van de internationale allocatie van vastgoed niet gerechtvaardigd is.